APPENDIX G

ADAPTIVE MANAGEMENT PLAN

JACKSONVILLE HARBOR NAVIGATION (DEEPENING) STUDY

DUVAL COUNTY, FLORIDA

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ADAPTIVE MANAGEMENT PLAN

The Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) state that agencies may perform monitoring “to assure that their decisions are carried out and should do so in important cases.” The Jacksonville Harbor Deepening Project is an important one, as it has the potential to adversely affect nationally important resources. In addition, since predictions are made about future effects to biological resources, there is a degree of uncertainty about the impacts which the recommended action would actually produce. Those uncertainties include the accuracy of the predictive impact tools, the changes to the environment, and the biological responses that will occur as a result of changes in the environment.

In general, adaptive management is a formal process for continually improving management policies and practices by learning from their outcomes (Taylor et al., 1997). For this project, adaptive management is defined as evaluating the accuracy of the predicted environmental impacts and assessing the effectiveness of the mitigation features to ensure the levels of environmental effects predicted in the Draft Supplemental Environmental Impact Statement (DSDSEIS) are not exceeded.

Field investigations were conducted during the development of the DSEIS to identify important resources in the project area and obtain data from which to develop predictive tools for impact evaluation. Field investigations will continue both during and after construction once a decision is reached on whether to implement the proposed project deepening. Long-term monitoring (15 years) will be conducted in order to determine whether the models have accurately predicted effects and whether the proposed mitigation sufficiently offsets the predicted impacts.

The definition of adaptive management as stated above has two components. There is a corresponding goal for the adaptive management program for each of those components.

The first component consists of evaluating the accuracy of the predicted environmental impacts. The corresponding goal is to improve the predictive capability of the models used to identify and quantify project-induced impacts. This includes both the hydrodynamic and ecological models. The EFDC hydrodynamic and salinity model, validated for the Jacksonville Harbor Deepening Study, provided the means to assess the direct impacts of channel modifications to salinity and water circulation in the main stem of the Lower St. Johns River (LSJR) (see hydrodynamic modeling report in Appendix A). The ecological models for the LSJR describe, in various formats, predictive relationships between salinity or water age and characteristics of five LSJR ecological components: wetland vegetation, submerged aquatic vegetation, benthic macroinvertebrates, fish and plankton as described in the ecological modeling report (Appendix D).

The second component consists of assessing the effectiveness of the mitigation features. Here the goal is to identify how effective the constructed mitigation feature is at compensating impacts. Physical parameters would be monitored within the estuary that describes how the system is functioning with the project in place. Biota would also be monitored to determine the system's biological responses to those parameters. After post-construction monitoring data is available, the updated models would be rerun using the observed conditions. This would provide the basis for the model's predictions for conditions under the observed conditions. Those predictions would be compared to the observed physical parameters to determine the accuracy of the models and the effectiveness of the mitigation features.

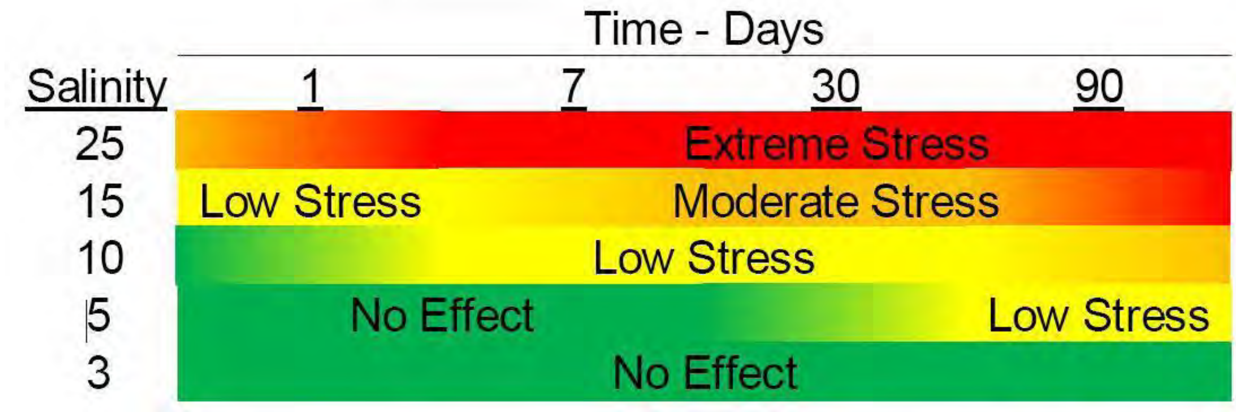
If the success criteria for the mitigation, as described in the mitigation plan (Appendix E), are not met then modifications would be warranted and re-coordination with the regulatory agencies and the public would occur. The mitigation plan for the deepening project consists of six different components:

- Nutrient Reduction
- Blueway Conservation Lands
- Timucuan (TIMU) Ecological and Historic Preserve Conservation Lands
- TIMU Monitoring
- FFWCC Monitoring
- Mitigation Bank Credits

In addition, if long-term monitoring indicates modifications are found to be warranted, re-coordination would occur. For example, should SAV stress levels exceed those anticipated in the SAV model and DSEIS, then the model would be re-run using the new field data and re-coordination with the regulatory agencies and the public would occur.

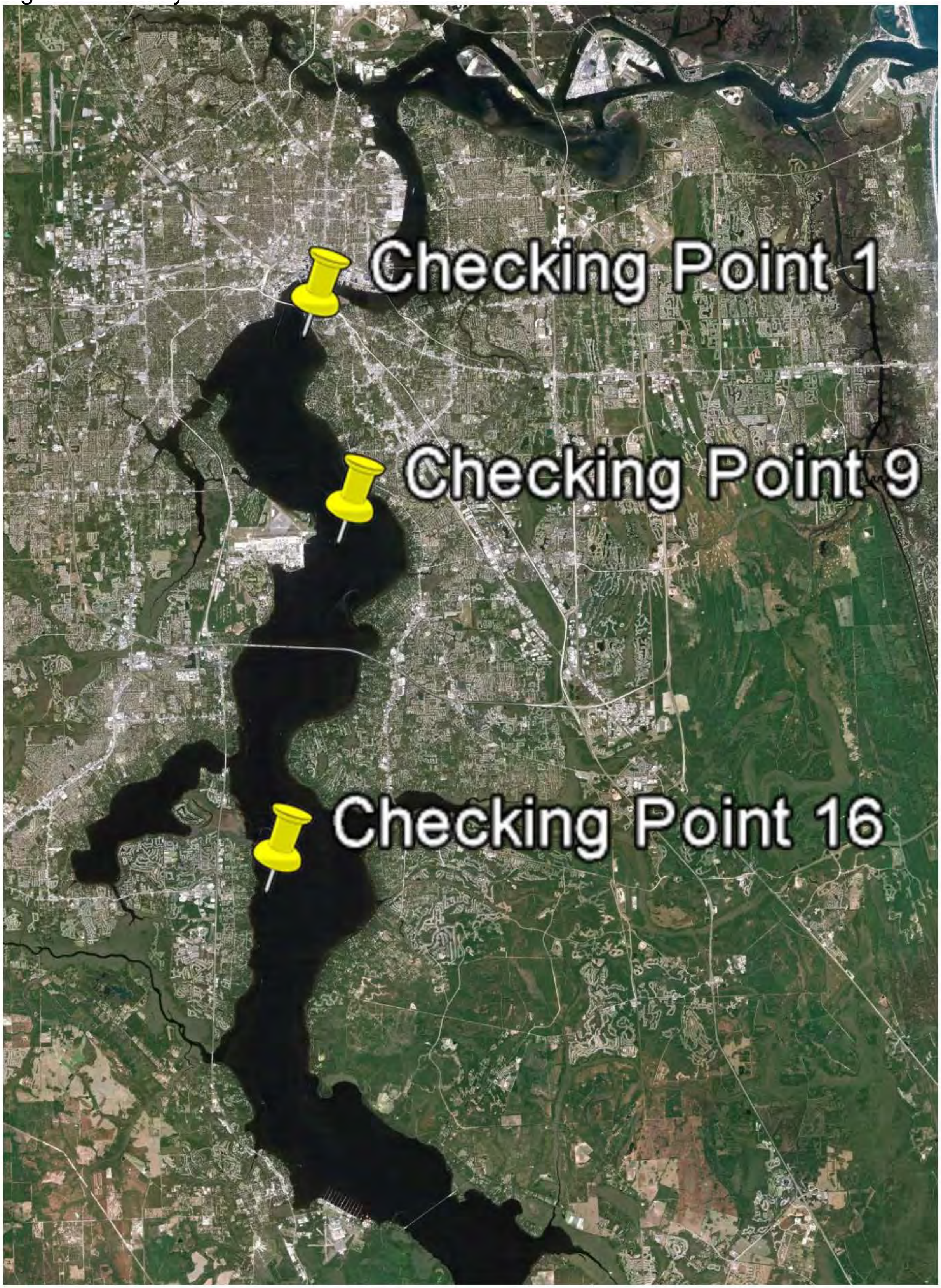
Figure 1 depicts the effects of salinity level and duration of exposure on *V. Americana* which is the representative species for all SAV analyses chosen by the ecological modeling working group due to the species cosmopolitan nature, dominance in the estuarine portions of the river, biological importance, and well-studied physiology and ecology.

Figure 1. *Vallisneria americana* Stress Levels



Finally, should salinity changes exceed those anticipated in the EFDC model and DSEIS, then the model would be re-run using the new field data and re-coordination with the regulatory agencies and the public would occur. The EFDC model showed the effects of proposed dredging improvements to hourly salinity at three stations between Acosta and Shands bridges (Check Points #1, #9, and #16, Figure 2) selected by the Corps along the LSJR. The results showed that the deepening would increase salinity at all three locations. Salinity increases average about 1.5 ppt at Check Point #1; average salinity changes then decrease upstream. Average salinity changes drop to about 0.8 ppt at Check Point #9 and to about 0.3 ppt at Check Point #16 (**Figure 2**). Again, these anticipated changes would be compared to the results of field investigations to evaluate the accuracy of the predicted impacts. Should salinity changes exceed those anticipated, then the model would be re-run and re-coordination would occur.

Figure 2. Salinity Check Points



Taylor, B., L. Kremsater and R. Ellis, 1997. Adaptive Management of Forests in British Columbia. Ministry of Forests, Forest Practices Branch, British Columbia.